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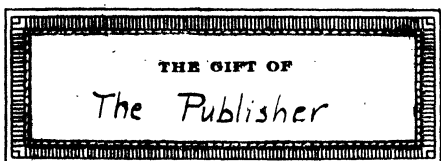
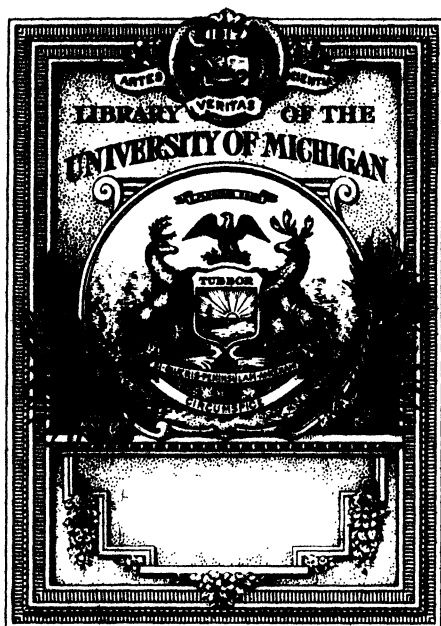
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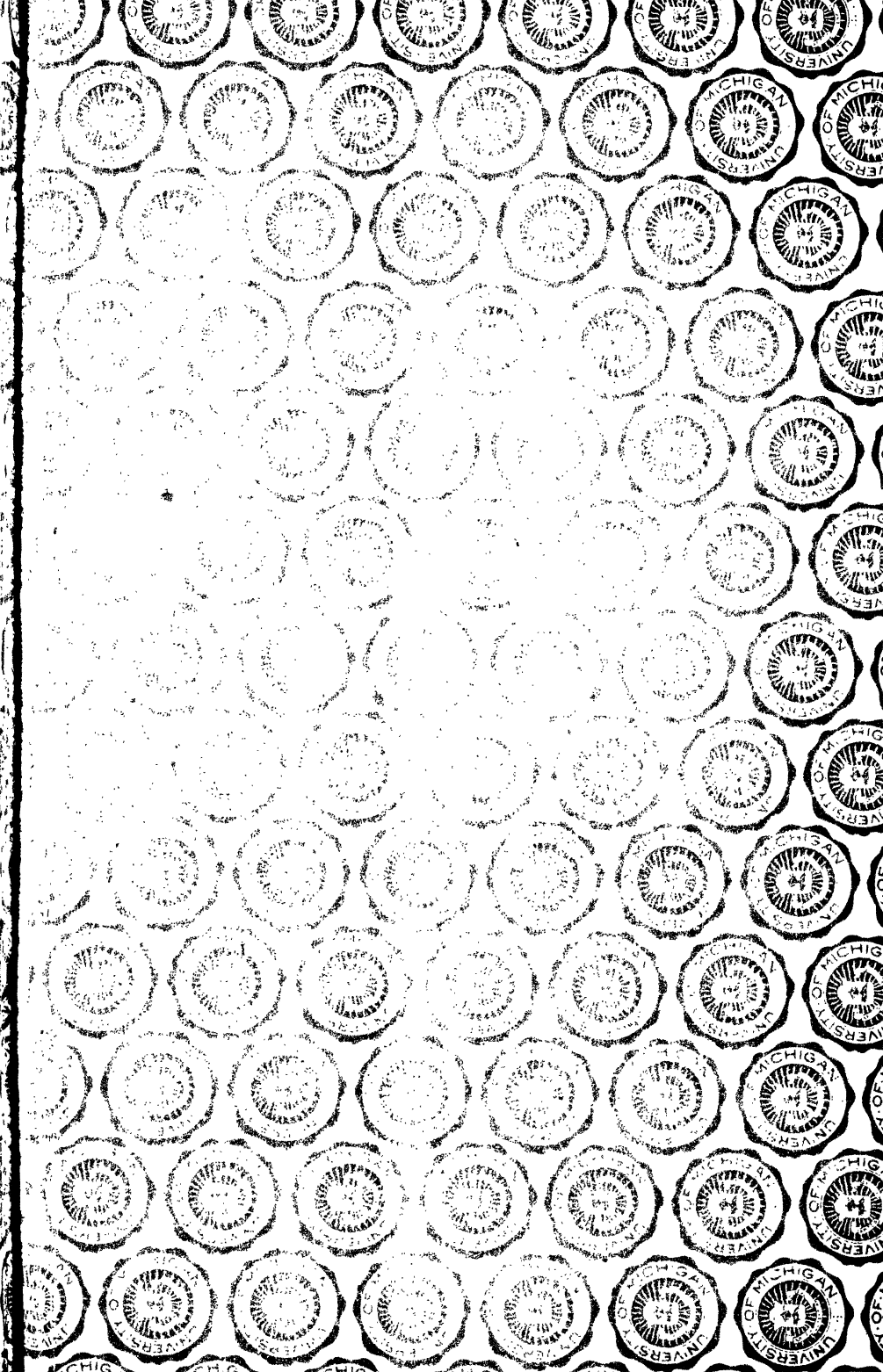
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The AMERICAN DENTAL JOURNAL

BERNARD J. CIGRAND, M. S., D. D. S.
Editor Publisher Proprietor.

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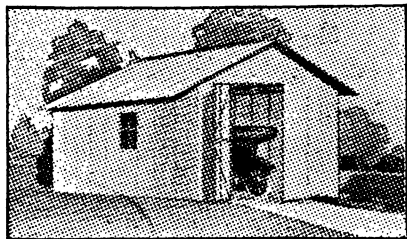
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July 15

EDITORIAL AND COMMENT

1914

FEAR OF PAIN—AND DENTAL NEGLECT

PART II

The problem of how to dispel fear from our patrons is one of the most neglected features of our professional education. Too little attention is given to this prime factor in practice building. Students at colleges need not give this matter the close study which the practitioner must give, as the college patrons come knowing that a percentage of charity clouds their call, and hence they endure more pain, overlook more inattention and are less particular in a thousand different matters which, if they called at a private office and paid a high fee, would induce them to be more exacting and expect a diminutive amount of pain. The young graduate is confronted with a different atmosphere when he opens his private office; his stern and semi-dictatorial tone must assume a more confidence beget-

ting note or he will perform little of the contemplated work. Only after he has realized that his patrons anticipate that he give them plenty of time, eliminate the hurry and rush moods, will he gradually command their confidence. For this special reason he must not crowd his appointments too closely, as it will necessitate working rapidly, and induce a worry and haste in every move he makes. The patient in the chair is quick to



FATHER: "Why, I go with you; the doctor will be good to you."

observe the situation, and feeling that the dentist is rushing through with his work, and naturally is less careful and more likely to get careless and reckless about the entire dental task. Gradually the patient weakens, and finally the operation is completed with the possibility arising of the patient having less work done than originally planned, because fear of being hurt, because the dentist is too busy—too rushed and too occupied—to do the work carefully and without interfering items. The art and the science of being in a hurry and not to appear

in a rush—that merits your careful observation. Dentists as a rule have too many patients, and those who are waiting get tired,—anxious either to go home or get into the chair,—and as a whole destroys the calm equilibrium of the operator.

But I hear the reader say: “To appear successful brings success.” Hence to have a crowded reception room, with many people waiting makes people say: “He is doing a rushing business; he has never got a minute; his appointment book is filled for six weeks in advance.”

By all that's holy! please do not permit that idea to get abroad; for real good patrons, such as can pay the price, will be afraid of you, and their fear of hustling, hurrying and hastening will make them call on some dentist who has more time, and quite likely a more confidence begetting personality, with the possibility of being more eager to do real earnest, honest dental service—and the latter element is the real test.

Bargain hunters may be inspired at seeing your reception room crowded. They will wait to see you, waste your time in unnecessary conflagration, make an appointment, pay down some, run up a bill, get their name on your ledger and eventually cheat you. These bargain hunters may be all right in merchandise business, but in dental practice they are a botheration, a pest and an unreliable clinic. They talk loud in your office and drive away desirable patrons, because they create a fear in cultured minds; they want you to cater to a rough, uncouth patronage. Eliminate all these bargain hunters; and when they tell you that they called and saw the dentist on the opposite corner who would do it for less money, be polite and tell them to go to him as he is a good, reliable dentist, and will do just as he agrees. This often stops all babel, and they will know that they are in a real dental office, where “shop talk” and cheap rumor and dental gossip are unwelcome elements. This policy will hold your desirable and worthy patrons, and may reform and educate the bargain hunter who, under proper surveillance, may become a stable compound.

Frequently—yes, too often—the dentist has induced fear in a patron who has come filled with courage and stimulated with

confidence from the home circle. The home may have been deeply concerned in getting the sixteen-year-old daughter to have some gold fillings or crown work done. The father and mother have both faithfully pictured you a man who will be very kind, very careful and very pleasant. Finally the child's nervous fear has been conquered, and in a happy, confiding attitude she comes to you and submits herself to your professional judgment. Unmindful of her preparation, and possibly indifferent to admonishments, either verbal, by 'phone or in writing, you plunge into the work in hand. With a big chisel you break off overhanging, weak margins. With dull burs and wobbling hand-piece you tear out sensitive dentine, and with dull hoes, hatchets and spoons the cavity is hastily and cruelly shaped. What is the result? The little patient has endured it all believing that it is dental kindness, dental goodness and dental art. The filling or crown is located and the patron dismissed. The work is satisfactorily done; all seems comfortable; but forever and a day that patient has a dread of dental service, an indescribable fear of visiting the dentist. She grows up, marries, has children of her own, but they in her mercy have an inborn dread of dental service. A wrong has been committed in having thus unnecessarily tortured the mother when she was a child in her teens; and because of her fear countless others have been inoculated with that beweakening, life-destroying monster called fear.

At the meeting of the Iowa State Dental Society in 1898, sixteen years ago, I spoke on this subject (page 129) and I believe more firmly than ever in my words at that gathering: "Now I like the spoon very much in sensitive dentine, because in the spoon there is no sharp angle, and since it has a round dipper-shape, you can drag out and dredge out, but you can not puncture with it. I wish to be frank when I say that I do not use the hoe and hatchet very much. I much prefer the spoon and chisel, adding to these the bur. I believe with the bur, if you have a sufficient number of burs from which you can select, if you know how to manipulate the bur, and have an engine that is true and perfect in its running, not a hand-piece

that wabbles all over the office, but one that is true, and with good, sharp burs of sizes and varieties to suit your idealism, you will accomplish excellent results. I can cut sensitive dentine and tooth structures with less pain to the patient, and with less nerve force being employed on my part, than I can with hatchets, hoes and chisels. Now this is simply my private opinion founded on some years of experience. We are here to acknowledge these things as we find them in our daily practice, if we are in truth professional brothers. I am a firm believer in small burs—very small, as small and smaller than the head of a pin. In using them do not constantly keep drilling at one point—a little bit at a time, and then take some other part of the tooth; and constantly keep the attention of the patient centered on the fact that you are not always drilling at one point. Soon they begin to feel that it is about time the dentist has drilled through the root; but by working around at different parts of the cavity and, employing small burs, you will accomplish more in a given time (on sensitive dentine or enamel) than with large burs.

“The best anæsthetic we have today is *kindness* and *sharp instruments*.”

If you can insert the first filling carefully and without much pain, the patients' fear leaves them, they become consoled in the belief that you are careful and considerate; and once you have gained their full confidence, you can gradually encourage them to endure more, and before the work has progressed far they are quite heroic, and you can depend on them helping you and making the task easier for both patient and dentist. But should the patient give evidence that it hurts too much, respect the signal, be eager to stop the pain and be prompt in rendering less torture. Once the patient is convinced that you are quick to stop inflicting pain, when they wince or give any sign of distress, you doubly increase their confidence in your kindness, and ere long fear has been fully mastered by confidence.

[To be continued.]

ORIGINAL CONTRIBUTIONS

THE LOVES AND HATES OF GERMS

BY FREDERIC J. HASKIN

[This scientific article is made to read like a love story, and it tells a new and instructive tale of the underworld that should interest dentists.—EDITOR.]

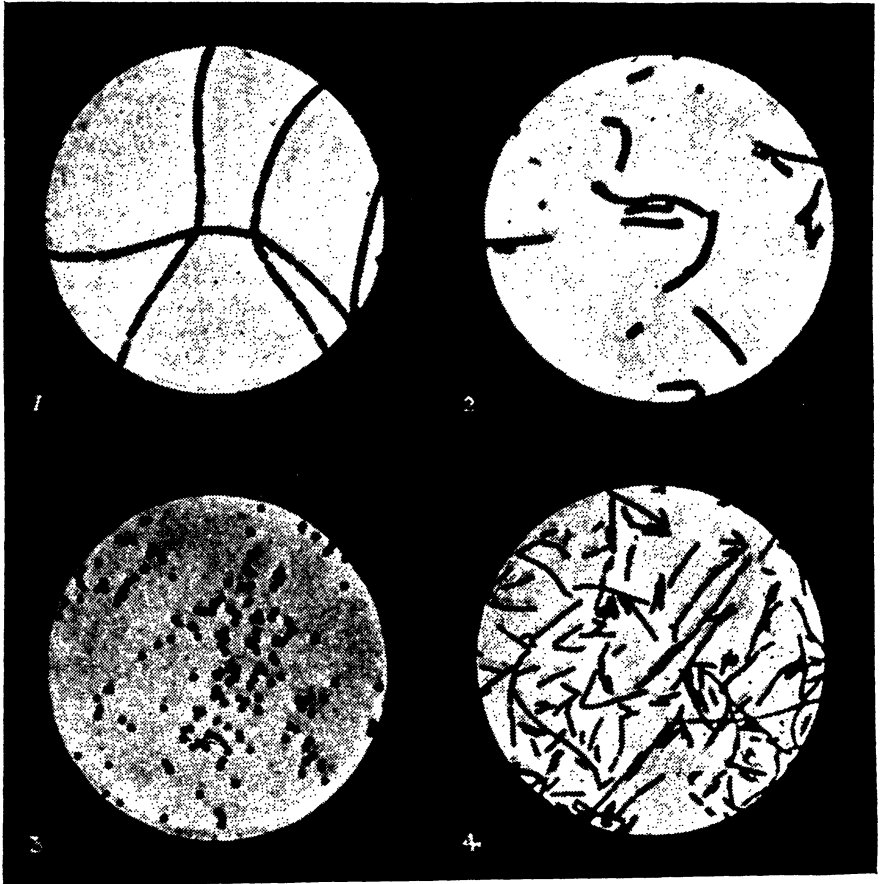
If the American people could be taken one by one through the great laboratories of the country, where patient scientists are investigating the causes of diseases, they would see realms undreamed of in all their philosophy. They no longer could assume that satisfied air of skepticism when the medical world says that diseases are produced by microbes, and that certain microbes produce certain ailments. For seeing is believing, and a modern medical laboratory is a place where one may see with his own eyes a thousand wonders that he never knew existed before, and who goes there inevitably comes out knowing not which to marvel at the most—the infiniteismal worlds revealed to him or the genius of the men who reveal them.

Thousands of people do not believe such a thing as a germ exists. And when even those who are credited with being persons of high intelligence are told that there are germs so small that the population of a drop of water might be as great as the human population of the earth they think it is only a fairy tale of the medical world. Yet the bacteriologist can tell you more about the life habits of germs of that size than the average reader can tell of the life habits of so familiar sight as the English sparrow.

GERMS OF DIVERSE KINDS

The germ may be an animal, like the one that causes malaria, or a vegetable, like the one that produces tuberculosis. The germ may be fond of oxygen or may detest it. Some of them die in the open air and some die when they can not get

it. Some germs are round, like periods; others are long, like dashes, and others are shaped like a series of commas tied together. Some can stand heat, and some can resist cold. Some



VARIETY OF BACTERIAL FORMS

germs cause sickness and others promote health. The cross-examiner of the laboratory makes the germ on trial tell to which class he belongs. Some absorb colors and others do not, and

the cross-examiner forces Mr. Germ to tell to which faction he belongs. Some are able to swim around like fish in the water, while others are as helpless as a piece of driftwood. Some, when they get in a tight place, where death seems to be their only portion, form spores, which can stand many hardships, and afterward turn into natural germs again.

SOME CAN DRINK CARBOLIC

Some germs are repelled by certain substances which attract others; some can drink a carbolic acid solution as we drink lemonade; while to others it is as fatal as arsenic to mankind. Some die on exposure to moisture, while others are killed by drying. Some are so fastidious that they must have the most delicate broth imaginable to live in, while others can flourish like clams at high tide on a piece of old shoe leather, and some transform starch into sugar, while others manufacture sugar into glucose. These and a hundred other different traits are characteristic of germs, and by the time Mr. Germ is made to answer every such question, the bacteriologist knows exactly where he belongs, just as well as the farmer knows a sheep from a cow.

And by the time the layman has followed the bacteriologist through this course of cross-examination he can not fail to appreciate his wonderful work. He is the biggest vegetable and stock grower in the world. He grows tens of billions of plants and animals. And he studies their tastes and traits as carefully as ever a hotel-keeper studies the tastes of his guests. He gives them sterilized food to eat, keeps their surroundings cleaner than a queen's kitchen, keeps their rooms heated exactly to their liking, and surrounds them with everything imaginable to make them healthy and prolific.

HOW A COLONY OF GERMS IS GROWN

When the bacteriologist wants to grow a large family of germs—he calls it a colony—he puts some of them into a sterilized preparation which hardens. There then is no chance for their moving around. So each little germ settles down to itself and begins to break in two, and then each of those pieces into two other pieces and so on, until the family becomes as number-

less as the sands of the seashore. When he wants to take the census of the germ population of a given colony he puts them into a sterilized fluid, adds ten times as much more fluid, and then ten times as much more, and so on until there are so many drops of fluid that each can have only a few germs in it. Then he puts one drop under the microscope, and counts the inhabitants in it. By the reverse process he is able then to calculate mathematically how many germs were in the entire colony.

In a well-equipped laboratory there are germs of all kinds. Here is a great mass of matter on a slice of Irish potato. It represents millions of tuberculosis germs, each one of which may be seen with the high-powered microscope the doctor uses. Here is a row of little tubes with cotton for stoppers. Each of them contains typhoid germs enough to start an epidemic. Here are some tubes containing tetanus germs, which under a microscope look like little drumsticks, and the poison or toxin they generate is so powerful that the eightieth part of a single grain of it will kill a horse, a poison that makes the venom of the rattlesnake seem harmless in comparison.

GERMS CAUSE HYDROPHOBIA

There, mounted on a slide, in a slice of paraffin so thin that one might stack up ten thousand of them in a pile one inch high, are a lot of little colored bodies taken from the spinal cord of a dog. They are called Negri bodies, from the name of their discoverer, and when those little specks are visible under the microscope you may be sure the dog had hydrophobia. If you do not believe it, put some of it into a mouse or a guinea pig and see how certainly it will go mad. Then here are tubes of measles germs, typhus germs, malarial germs, pneumonia germs, a thousand different kinds of germs, and the doctor always has methods of proving that what his eyes tell him is right.

In studying microbes the laboratory expert must have infinite patience. He must have the touch of an artist, the imagination of a poet, the hard sense of the farmer, the passion for exactitude of the mathematician, the tenacity of a bulldog, and the open-mindedness of the man who accepts nothing as proved until it can not be explained in any other way. He must make

the most painstaking measurements, keep his instruments absolutely sterile, try every theory he advances with the acid test of practical application, and make as sure as it is humanly possible that his reasoning is correct.

SAVES THOUSANDS OF LIVES

What the study of microbes has brought to the human race in the way of better health and longer lives is inestimable. Aseptic surgery has saved its tens of thousands in peace and in war, both by preventing blood poisoning and the like, and by making possible operations that otherwise could not have been undertaken. Since Koch discovered the germ of tuberculosis the death rate from the white plague has been cut in twain. Typhoid, diphtheria, yellow fever, a hundred diseases of man and animals have been robbed of their worst terrors, and all that is now needed is the acceptance by the people of the knowledge that the laboratory has developed about germs and their ways, and a nationwide and unrelenting warfare on the bad ones, with the medical fraternity to captain the fight.

Much will be heard at the international congress of hygiene and demography at Washington, D. C., about what the world has been doing during the past five years in its effort to master the microbe. There are scientists engaged in efforts to run down new microbes, and this now is a fight largely to prove the existence of germs that are too small to be seen even with the most powerful microscope. For instance, nothing is better proved than the existence of the germ of yellow fever, and yet it is too small to be seen even with the microscope eyes of the laboratory. The same is true of measles. The laboratory expert is able to inoculate monkeys with these microbes, but he can not see them. The same is true of rabies. Malignant tumors have been transmitted by these invisible microbes, and typhus fever may be reproduced in the laboratory in monkeys, although the microbe which causes it refuses to make itself known through the microscope. Thousands of germs have been found and their life histories written as accurately as are the life histories of chickens and sheep, but the bacteriologist, having reached the limit of the power of his microscope, has set to work to

locate others by circumstantial evidence. He has succeeded in proving the existence of some that can not be seen, and he hopes to add a long list of others, and incidentally to gain new insight to mysterious diseases.

THE MILLIONTH PATENT

BY WILLIAM N. TAFT

[Readers will be surprised to read this article; and in view of the fact that upward of 150,000 patents are of a dental or surgical nature, it will awaken deeper consideration for the great patent department. There are hundreds of dentists who possess scores of patents.—EDITOR.]

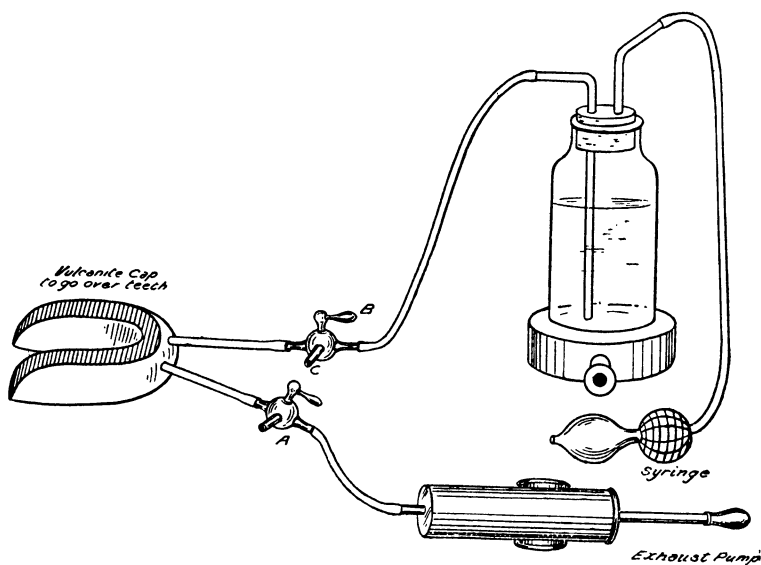
The mere statement that the issue of patents has passed the million mark is in itself enough to provoke wonder, but a comparison of the number of patents issued in other countries—centuries older than the United States—brings to light many interesting figures. France comes nearest to the United States in the number of licensed inventions, 430,000 being approximately the number of her patents. Great Britain is next with 416,000; Germany has issued 236,000; Belgium, 228,000; Canada, 126,000; Italy and Sardinia, 94,000, and Austria-Hungary, 68,000. All the other countries of the world have issued less than 60,000 patents each. So that the United States may easily be said to have licensed more inventions than any two nations put together, and that her total exceeds that of Great Britain, Belgium and Italy by several thousand.

Perhaps it is because the American is truly a cosmopolite—a mixture of all the bloods of the world—that this nation has so far surpassed others in inventions; but true it is that the majority of the important discoveries of science and the greatest labor-saving machines first saw the light of day in the United States, and that the documents granting their inventors the exclusive right to manufacture and sell them are today reposing in the patent office at Washington.

Among the historic documents in the patent office library are the specifications and models for the steamboat, the telegraph, the telephone, the cotton gin, the mowing and reaping

machine, the improved automobile, the aeroplane and countless other machines the invention of which has lightened the labor of the world and improved its method of locomotion, correspondence and living to an almost incalculable degree.

There exists in the patent office library at Washington the first patent ever issued in this country (shortly after the close of the Revolution). It is a queer document, this first patent, quaintly worded and with many a turn and twist of chrography



SPECIMEN DENTAL INVENTION—FORCEFUL MEDICATION

peculiar to our forefathers. It was issued to Samuel Hopkins, July 31, 1790, for a device for making pot and pearl ashes. The archives of the department show that the issuance of a patent in those days was a state occasion. The president and cabinet met in solemn conclave and, after having deliberated upon whether it was proper for the inventor to have the sole right to the manufacture of the child of his brain, presented him with the papers bestowing this privilege upon him. Hop-

kins was warmly congratulated by President Washington, and the event was recorded in all the diaries of those present.

Thus it was for some time afterward. Every inventor had to submit his appeal for a patent directly to the president, and it was acted upon by the entire cabinet. The consequence was that patents came few and far between, and the year 1790 saw only three of these documents issued. Besides the one to Hopkins, one was granted to Joseph S. Sampson for the manufacture of candles, and the other to Oliver Evans for the manufacture of flour and meal. All three of these were issued and signed by George Washington. Several other patents were issued and signed during the administration of the first president, but the records are not clear as to their number.

Washington, himself a patron of the arts, was liberal and generous in his rulings concerning the issuance of patents; but President Jefferson, fearing that government grants might have the effect of promoting private monopolies, was particularly strict in his censorship of patents.

Dr. William Thornton, an Englishman by birth, and formerly a clerk in the state department, was the first superintendent of patents appointed. It was his duty to see that all the applications for patents were made in the proper form, and that it was right that they should be granted. The actual issuance of the papers, however, was still retained in the hands of the president and the cabinet. Dr. Thornton's salary at the time he was first appointed was \$1,400 a year. His term of office dated from May, 1802, and lasted twenty four years.

The patent office as it exists today was established by an act of congress of July 4, 1836, and the first commissioner of patents was Henry L. Ellsworth, of Connecticut. It was coincident with the establishment of the patent office that the searching system came into vogue. This consists in looking through all the files of the office to see if any patent similar to the one applied for had previously been granted. This had not been done previous to 1836, and no adequate force had been able to perform the work.

The year 1836 also marks the commencement of the present

series of patents, numbered consecutively. Before this time 97,902 patents had been issued, but no record had been kept of their consecutiveness. These were therefore disregarded in the establishment of a new system; and the first patent of this series was awarded to John Ruggles (July 13, 1836) for a locomotive engine. It is rather a strange coincidence that Patent No. 1 and Patent No. 1,000,000 should both have been awarded to improvements in the foremost modes of locomotion of their times, and that these inventions mark the progress of two machines which represent the highest form of power transference then known.

From 1846 to the present time the number of patents issued has been steadily increasing until at the present time it is not unusual to see from 500 to 700 issued during a single week. An example of the enormous increase in the number granted can be found in the fact that Patent No. 500,000—awarded to E. S. Hyde for an improvement on sewerage—was issued on June 20, 1893—only eighteen years ago! Thus it took fifty-seven years to accumulate the first half-million patents, and only eighteen years to gather the last half-million. Truly is this a wonderful growth, both in inventive ability as well as in recognition of this ability by the government; for in the first two decades of the system very few patents, comparatively speaking, were issued, the Jeffersonian prejudice against government aid of private monopolies not having died.

For each patent issued the government charges a fee of \$35—\$15 upon the filing of the application and \$20 upon notice that the same has been granted, regardless of the length of the specifications or the complexity of the invention. That this charge is extremely reasonable may be seen from the fact that every patent of the million and more stored away in the vaults of the department has to be gone over to discover if the application will conflict with any existing patent, or if the idea is such that a patent can not be granted on it. This work, through a complicated system of filing, is today rendered comparatively easy, though two decades ago it was considered a tremendous task, although the patents were not half so numerous at that time.

From the first superintendent of patents in 1802 to the present commissioner of patents is a long step. Many changes have taken place during this time, but it is considered that the patent office today presents an example of a highly specialized and finely organized institution where the papers relating to any patent may be secured at a moment's notice and where there is not much difficulty in discovering whether an invention has been patented before or whether there is any other difficulty in the way of its being patented at the present time.

When the first patent was issued the President of the United States made the grant, as we have seen, while the record was written by a clerk in the state department. Then followed the patent board, composed of the secretary of state, the secretary of war and the attorney general. This was continued until 1836, when the first commissioner of patents was appointed, and this office has remained in force until the present day, Edward Bruce Moore being the present occupant of the chair.

THE LURE OF INVENTION

The lure of invention is one that influences all people and spares no class or condition of men. From the clergyman in his study to the convict in his lonely cell, it exerts its attraction, and both are found enrolled among the list of patentees, although not so precisely identified. The stimulus is not always the hope of fee or reward, for we find the millionaire as strongly interested as the very poor. There is something in the attraction that can not be resisted. Someone has said that writitg is like flirting. If you can not do it, no one can teach you to do it, and if you can do it, no one can keep you from doing it. So it is with invention; no one can teach you to do it, and if you have the divine afflatus, no one can prevent you from exercising it. This is fortunate; for the inventor is subjected many times to discouraging influences in the first instance. Have you ever noticed, however, the pride with which anyone will display an invention even of the simplest character? Surely this is commendable, for we all admire originality, and invention is originality, often of the highest order. While the lure may be regarded apart from the results, we can not help realizing what a poor world this would be except for the beneficent works of the inventors of all times.

CENTENNIAL CELEBRATION FOR IODINE

BY DR. B. J. CIGRAND

The discovery of iodine in 1814 was one of the great finds of medicine. Dentistry long since recognized its value in bleeding wounds, and only recently has Mother Medicine awakened to its virtues.

The centennial anniversary of the discovery of iodine by Courtois was recently celebrated in due form, and brings this interesting element into notice. It is a rather recent discovery that it exists in the human body, and in especially large quantities in the thyroid gland. Improved tests have shown that it is much more widely diffused in nature than was at first thought. It exists not only in the salt sea, but also in river water. The Seine contains $\frac{5}{4}$ of a grain in ten tons of its water. Air contains infinitesimal amounts of iodine. Many food plants contain it. It is found in pineapples, beets, mushrooms, rice, garlic, dandelion leaves. It is found in comparative abundance in sweetbreads, fish and sea food generally; somewhat in beef (fat beef), and more in pork.

It is absent from peas, beans, lentils, most fruits and the chief cereals.

Milk contains very little.

Iodine has great curative value in vascular tissues, while to osseous tissue it is destructive.

Taking it for granted that the readers know of the uses for iodine, I have taken the pains to look up something of the discovery and the man who has done so much for medical dentistry, since prosthetic dentistry and operative dentistry receive liberal consideration.

The distinguished chemist who gave us iodine was Bernard Courtois, pronounced in French like "kooor-twa." He was born at Dijon, France, in 1777, and died at Paris in 1838. He was an untiring researcher. He discovered morphine in opium. While others in after years claimed this honor, he quietly and without rebuttal permitted the credit to stand; but his friends

who knew of Courtois' discovery, and were familiar with his experiments, proved that many years before Seguin's announcement Courtois had employed it and knew its physiological action.

The discovery of iodine was purely accidental. In 1804 he began to experiment on nitrate of sodium, the process consisting of indecomposing nitrate of calcium by the carbonate of sodium obtained from kelp. In the course of his operations he observed that the iron kettles in which he labored were coated with a purple crust, which later he called iodine.

Let us see! what is the meaning of iodine? Why, it means—oh! you know; that's so—it means purple. It's made of kelp.

Small traces of iodine can be detected by applying starch, which it turns blue. This tincture, however, is eliminated by applying heat, though the azure shade comes back if cold air is rushed over the part.

Iodine is now the central element for innumerable experimentations. In the next few years a variety of medicines with iodine as the mother will be proclaimed as medical agencies. Even in "war times," like today, iodine, is forming an important part in constructing explosives. Treated with ammonia, it leaves a residue of dark brown powder which is so delicate that mere touching explodes it.

Some of the words used in connection with iodine are:

Iodism—Morbid effect of iodine caused by an overdose,

Iodize—To treat with iodine by means of inhalations or external application.

Iodizer—One who employs iodine as a coloring agent. To make purple.

Iodoform—Obtained by heating iodine with alcohol mixed with sodium carbonate.

Iodo—The prefix of iodine in an adjective sense, as iodo-bromate, iodine and bromine.

Iodide—A compound formed or impregnated with iodine or its subordinaries.

Iodic—Adjective of iodine.

Iodic Acid—A monobasic acid obtained by boiling iodine with strong nitric acid; also formed in conjunction with chlorine.

There are upward of three hundred other terms associating iodine with recent discoveries.

TRANSMUTATION AMONG MICROBES

BY MME. VICTOR HENRI

[Continued from page 166, June issue.]

[It is with considerable gratification that your editor presents this splendid article regarding the startling discovery of a woman, Mme. Victor Henri, whose research work in bacteriology has caused the investigators to "sit up and take notice." If she can prove her position, it will revolutionize much in our methods of treatment. Keep your eye on the ultra-violet rays.—EDITOR.]

Some of these newly formed microbes are not affected by color, which are also fixed, and produce a peculiar kind of disease when inoculated. To quote the text of the paper approved by Mme. Henri and her husband:

"M. and Mme. Victor Henri have for the last four years been making researches into the divers actions of ultra-violet rays on different micro-organisms. In a number of various publications they have already described the conditions in which microbes are killed by the ultra-violet rays (when the exposure is very prolonged), and they pointed out that these ultra-violet rays destroyed the microbes because the rays produce chemical action on well-defined chemical bodies existing in the cells.

"Afterwards they discovered a new phenomenon described as the excitability of small organisms under ultra-violet rays. For example, tiny fresh-water shrimps of the size of one mm. react with a sudden movement as they come under the influence of ultra-violet rays. This led them to study more closely the physiological laws of this new mode of excitation, and Mme. Henri thereby came to observe the metabolic action of the ultra-violet rays when that action is limited, or, so to speak, graduated; and it was then that she discovered that the limited or graduated action does not cause the death of, but produces a more or less profound modification in certain micro-organisms.

"The most striking results have been obtained with the anthrax bacillus.

When these microbes are exposed to the ultra-violet rays, and when the exposure is not prolonged beyond a certain point, some of the microbes which survive develop entirely new char-



M'ME. VICTOR HENRI

acteristics, and become, so to speak, a new kind of microbe that no longer resembles the normal microbe of anthrax. The new microbes belong to the species "cocci," instead of being batonnets. Again, they may be grayish filaments that are not influenced by color, like the normal anthrax microbes. Moreover, the second kind of microbes do not liquefy gelatine, nor do they curdle milk, while the microbes of anthrax do so regularly.

"Lastly, these new generations of microbes are perfectly stable, and they have multiplied themselves regularly for the last three months, although they were put into a new and fresh medium every day. When inoculated into animals these microbes produce a malady quite different from normal anthrax. Instead of lasting two or three days, it lasts ten or twenty."

BONE TRANSPLANTATION AND ARTIFICIAL MENDING

BY PROF. JOHN B. MURPHY

[Every day is bringing the dentist nearer to the true definition of his degree—D.D.S., doctor of dental surgery. We are mostly engaged in surgery, while prosthesis follows closely second. We cut out, cut off and cut in, and we replace, reproduce and repair; hence subtraction and addition are our mathematical lifework. Dr. J. B. Murphy, famed as a molder of bone and an adept in its varied repairs, brings to the readers a new and fundamentally classic contribution. We must become more informed in basic surgery before we may attempt daring operations on the jawbone, but he makes the task possible since he leads you to comprehend the nature of the frame on which you daily labor. Personally I thank Dr. Murphy for this classic contribution. The illustrations are all made from original photographs.—EDITOR.]

In the study of the embryology of the fetal skeleton it is found that some bones are formed from a white fibrous elastic membrane, such as those forming the roof and sides of the skull. Others, such as the bones of the extremities, are formed from cartilage. Hence, two kinds of ossification are described, *intrafibrous* or *intra-membranous*, and *intra-cartilaginous*.

Intrafibrous Ossification. In the case of bones which are developed from membranes, no cartilaginous mold or stage precedes the appearance of the bone tissue. The membrane

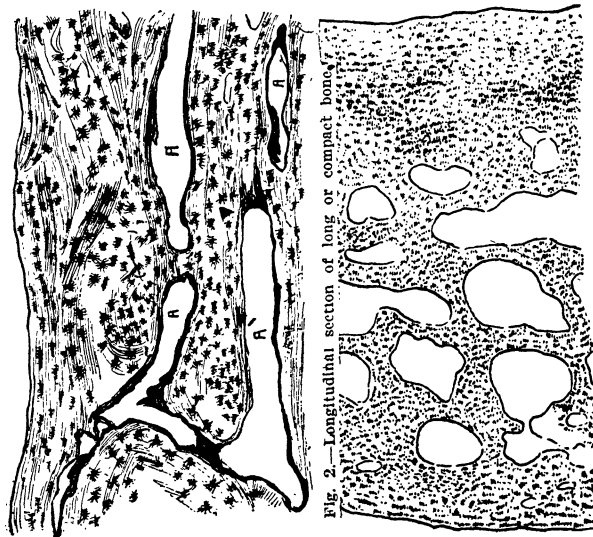


Figure 3

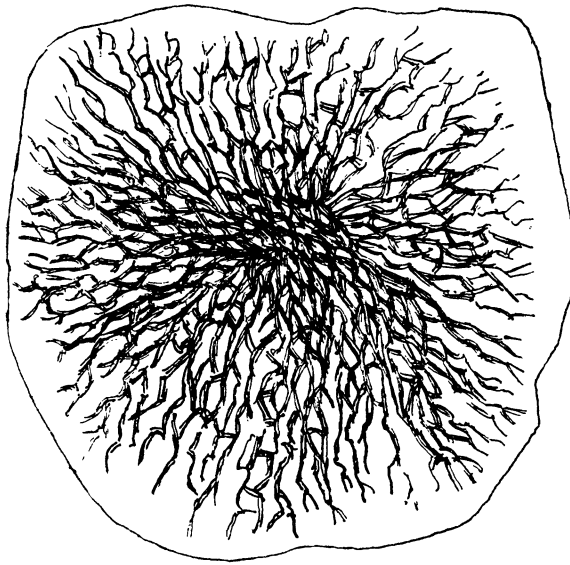


Figure 4

which occupies the place of the future bone is of the nature of connective tissue, and ultimately forms the periosteum. The outer portion is more fibrous than the internal, in which the cells or osteoblasts predominate. The whole tissue is richly supplied with blood-vessels.

At the outset of the process of bone formation a little network of bony spiculæ is first noticed, radiating from the point or center of ossification. Microscopically, it consists of a network of fine clear fibers with an intervening ground substance (Fig. 4). These are termed osteogenetic fibers. They soon take on a dark and granular appearance from the deposit of calcareous granules in the fibers and intervening matrix. As they calcify, they are found to enclose some of the granular corpuscles or osteoblasts. The latter form the corpuscles of the future bone, and the spaces in which they are enclosed are the lacunæ. As the osteogenetic cells grow to the periphery they calcify and then give rise to fresh bone spiculæ.

Thus a network of bone is formed, the meshes of which contain the blood-vessels and a delicate connective tissue crowded with osteoblasts. These bony spiculæ thicken by the accretion of layers formed by the osteoblasts and the meshes become smaller. Subsequently, separate layers of bony tissue are deposited in the periosteum and around the large vascular channels.

It is very probable that all lamellæ are in more or less direct communication with each other by means of the fine canals or canaliculi. The canaliculi of the haversian* lamellæ empty into the haversian canals. The lamellæ of bone are composed of fine white fibrous tissue fibrils imbedded in a ground substance in which they are arranged in layers superimposed in such a way that the fibers in the several layers cross at a right angle, forming an angle of 45 degrees with the long axis of the haversian canal. It is as yet undecided whether the mineral salts are deposited in the ground substance or in the fibrillæ.

Around the haversian canals are the concentrically arranged

[*The word haversian should be capitalized—named after Dr. Havers.—EDITOR.]

lamellæ, forming systems of haversian lamellæ. Besides the systems already mentioned there are found interstitial lamellæ wedged in between the haversian systems of lamellæ. Scattered between the lamellæ are found the spaces known as lacunæ, containing the bone-cells (Fig. 2).

In each lacuna there is found a bone-cell, the nucleated body of which practically fills the lacuna, while its processes extend out into the canaliculi.

The haversian canals contain blood-vessels, either an artery or a vein, or both. Between the vessels and the walls of the canals are perivascular spaces bounded by endothelial cells. Into these spaces empty the canaliculi of the haversian system. All the lacunæ and canaliculi should be considered as filled by lymph plasma which circulates throughout the bone, bathing the bone-cells and the processes (Fig. 3).

The marrow not only fills up the cylindrical cavity in the center of the shaft of the long bones, but also fills the spaces of the cancellous tissue and extends into the haversian canals. It varies in composition in different bones. In the shaft of the adult long bone the marrow is yellow, contains areolar tissue and vessels, and consists of a matrix of fibrous tissue supporting the blood-vessels. In short and flat bones and in the articular ends of the long bones the composition is somewhat different, consisting of seventy-five parts of water and twenty five parts of solid matter. In the marrow numerous cells are found, known as the marrow cells of Kolliker. They resemble in appearance lymphoid corpuscles. Among them may be seen the smaller cells, the normoblasts, from which the red corpuscles are derived.

Intracartilaginous Ossification. Just before ossification begins to take place, the bone is entirely cartilaginous, and in the long bone the process commences in the center (shaft ossification) and proceeds toward the extremities, which for some time remain cartilaginous. Subsequently, a similar process commences in one or more places in these extremities (epiphyseal ossification), and gradually extends from them. The extremities do not, however, become joined to the shaft by bony tissue until growth is completed, but are attached to it by a layer of cartilaginous tissue termed the epiphyseal cartilage.

The first step in the ossification of cartilage is the enlargement of the cartilage cells, which arrange themselves in rows at a point termed the center of ossification. The matrix in which they are imbedded increases in quantity, so that the cells become farther separated from each other. A deposit of calcareous matter now takes place in this matrix, between the rows of cells, so that they become separated by longitudinal columns of calcified matrix, presenting a granular and opaque appearance. Here and there the matrix between two cells of the same row also become calcified and the transverse bars of calcified substance stretched across from one calcareous column to another. Thus, there are longitudinal growths of the cartilaginous cells enclosed in oblong cavities, the walls of which are formed of calcified matrix, which cuts off all connection between the cells, and they form spaces called the primary areolæ.

At the same time that this process is going on in the center of the solid bar of cartilage of which the fetal bone consists, certain changes are taking place on its surface. This is covered by a vascular membrane, the perichondrium, on the inner surface of which, that is to say, on the surface in contact with the cartilage, are gathered the formation cells (genetic cells), the osteoblasts. By these cells a thin layer of bony tissue is formed between the perichondrium and the cartilage. There are in this first stage of ossification two processes going on simultaneously—in the center of the cartilage the formation of a number of oblong spaces, and on the surface of the cartilage the formation of a layer of true bone.

[To be continued.]

Preventing the Buckling of Gold Plates

To prevent the buckling of gold plates in swaging, a slit is cut at the median line, from the margin to the ridge, lapped over, and, when swaged, soldered. This should be done in all cases, as this is the weakest point and the plate breaks there. By doing this the weak point is doubled in strength.—*L. P. Haskell.*

Inlay Anchorage for Bridges with Removable Pivots

The retention of inlays, or of inlays used as anchorage for a bridge, can be considerably enhanced by passing a bur through the inlay in such a way that a platinum or gold pivot can be passed through the hole into the root-canal of the tooth. The direction of these pivots should be arranged so as to make the pivots converge. In bridgework the inlays and pivots are removed together in an impression, a model is poured, and the bridge finished. The inlay or bridge is cemented to place, the pivots are introduced into the holes while the cement is still soft, and ground off after hardening of the cement. In many cases the pivots can be made so short that devitalization of the pulp is superfluous, while at the same time increasing the retention of the appliance.—*Monatsschrift Zahntechnik und Verwandte Gebiete.*

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Palatine Mucous Membrane Flaps in Ankylosis of the Jaw

John B. Murphy describes two cases in which this procedure was adopted with very satisfactory results. In the first case the flap was removed from the hard and soft palate, and consisted of mucosa and submucosa. It was pedicled and tongue-shaped, and was swung outward so as to cover the denuded bony surface of the upper jaw formed when the jaws were chiseled apart. In the second case there were employed two tongue-shaped flaps, one from the floor of the mouth and the other from the hard palate.

THE AMERICAN DENTAL JOURNAL. One year for one dollar.

Keeping Carbolic Acid Liquid

A few drops of alcohol in the carbolic acid bottle will keep pure crystallized carbolic acid in a liquid form.—*B. W. Neave.*

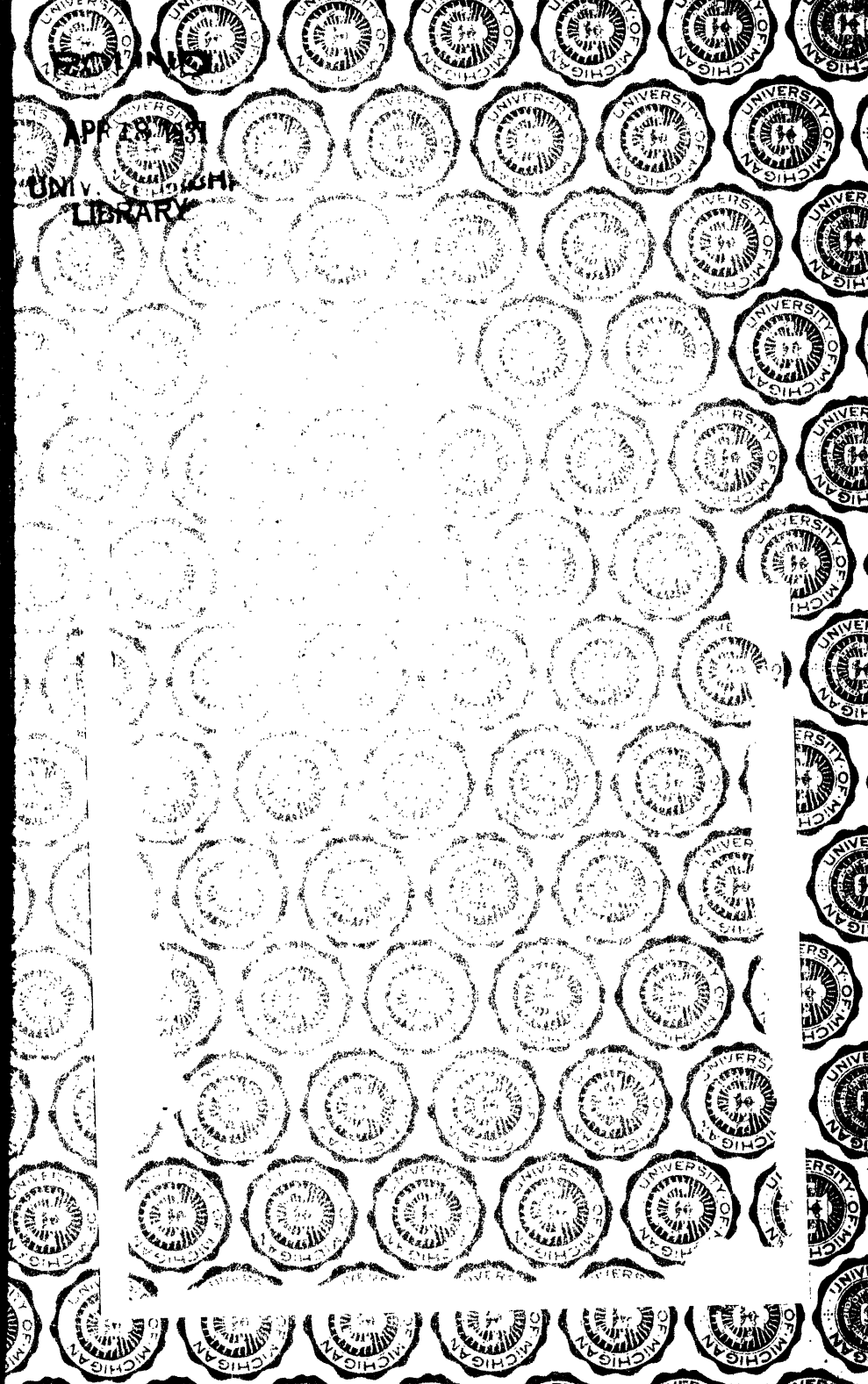
A Method of Refitting Artificial Dentures

Modeling compound is warmed, spread over the plate and inserted in the mouth; the patient is ordered to close to get proper occlusion. The compound is hardened by using cold water, removed, the edges are trimmed to suit, the case is warmed to soften the compound. The flask is then separated, the compound removed, and the old rubber roughened by using large burs or carborundum points. The plate is then packed, vulcanized and finished.—*L. E. Day.*

Wax-Gold Inlay

A spatula full of hot inlay wax is melted into mat gold, and the impression of the cavity is taken in the same way as with wax. The wax-gold impression is removed when cooled, and invested in any good inlay or bridge investment completely, except a small place of about four mm. in diameter, through which to flow solder. After the investment is dry it is placed on the fire and heated up, keeping the heat underneath the investment all the while. The solder is cut into strips, and when the matrix is hot enough the solder is flowed in. This is a very practical method of utilizing mat-gold scraps. This method was taught in 1895 by Dr. Emery Ballou, of Dodge City, Kan.—*D. D. Campbell.*

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